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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte Pranabes K. Pramanik

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Appeal 2007-1947  
Application 10/782,130  
Technology Center 1700

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Decided: 1 April 2008

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Before RICHARD E. SCHAFER, SALLY G. LANE, and  
JAMES T. MOORE, *Administrative Patent Judges*.

1 Opinion for the Board filed by *Administrative Patent Judge* SCHAFER.

2

3

DECISION ON APPEAL

4 Applicant appeals from the Final Rejection of Claims 1-13, 15, 18-33,  
537-42, 44, and 47. 35 U.S.C. § 134(a). We have jurisdiction. 35 U.S.C. §  
66 (b).

7

STATEMENT OF THE CASE

8 An Examiner finally rejected Claims 1-13, 15, 18-33, 37-42, 44, and  
947 under 35 U.S.C. § 103(a) as obvious over the combined teachings of

1Appelt<sup>1</sup> and Fenoglio<sup>2</sup>. We affirm the rejection of Claims 1-13, 15, and 18-  
233 but reverse the rejection of Claims 37-42, 44, and 47.

3 FINDINGS OF FACT

4**Claimed Subject Matter**

5F. 1.The claimed subject matter pertains to a multilayered construction  
6 suitable for forming capacitors in electronic devices. Spec., p. 1, ll. 11-  
7 13, and p. 3, ll. 25 and 26.

8F. 2.Applicant's Figure 1, reproduced below, shows an embodiment of the  
9 claimed multilayered construction:

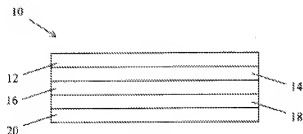


FIG. 1

10F. 3.The multilayered construction 10 includes electrically conductive layers  
11 12 and 20, and inner dielectric layers 14, 16, and 18. Spec., p. 6, ll. 7-19.

12F. 4.The conductive layers 12 and 20 may be copper. Spec., p. 8, ll. 2 and 3.

13F. 5.The dielectric layers 14 and 18 are made of thermosetting polymer,  
14 preferably an epoxy resin. Spec., p. 1, ll. 13-16; and p. 3, ll. 5-8.

15F. 6.The claims present two embodiments which differ in the nature of the  
16 central layer 16.

17F. 7. In the first embodiment, represented by Claim 1, the central layer 16 is  
18 a specified polymer. Spec., p. 12, ll. 8-13 and 23-26; and p. 13, ll. 1-4.

<sup>4</sup> US 2001/0005304, published June 28, 2001.

<sup>5</sup> US 5,003,037, published March 26, 1991

1F. 8.The polymer is an aromatic polyamide, polyethylene terephthalate, a  
2 polyethylene naphthalate, a polyvinyl carbazole, a polyphenylene sulfide,  
3 a polyether-nitrile, a polyether-ether-ketone, or their mixtures. App. Br.,  
4 p. 11, Claim 1; and Spec., p. 12, ll. 18-23.

5F. 9.In the second embodiment, represented by Claim 37, the central layer  
6 16 is a polymer precursor. App. Br., p. 15, Claim 37; and Spec., p. 12, ll.  
7 8-11.

8F. 10.The precursor is a monomer or oligomer of the same polymers listed in  
9 F. 7. App. Br., p. 15, Claim 37; Spec., p. 12, ll. 13-17.

10F. 11.Claim 1 provides<sup>3</sup>:

- 11 1. A multilayered construction suitable for forming capacitors  
12 which is formed by a process which comprises:  
13  
14 a) applying a first thermosetting polymer layer onto a surface of a first  
15 electrically conductive layer;  
16  
17 b) applying a central polymerizable layer onto a surface of the first  
18 thermosetting polymer layer, which central polymerizable layer  
19 comprises a polymerizable precursor of a polyethylene terephthalate,  
20 a polyethylene naphthalate, a polyvinyl carbazole, a polyphenylene  
21 sulfide, an aromatic polyamide, a polyether-nitrile, a polyether-ether-  
22 ketone, or combinations thereof;  
23  
24 c) applying a second thermosetting polymer layer onto a surface of a  
25 second electrically conductive layer; thereafter  
26  
27 d) attaching the first electrically conductive layer to the second  
28 electrically conductive layer such that each of the first and second  
29 thermosetting polymer layers and the central polymerizable layer are

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10<sup>3</sup> Throughout this decision, we refer to the Substitute Appeal Brief filed on  
11September 5, 2006. All references to the claims are to the copy appearing  
12the Claims Appendix submitted with that Brief. The Examiner has certified  
13the copy to be correct. Ans., p. 3.

- 1 positioned between the first and second electrically conductive layers;  
2 and thereafter  
3  
4 e) polymerizing said polymerizable layer;  
5 wherein each of said first thermosetting polymer layer, said second  
6 thermosetting polymer layer and said central polymerizable layer  
7 optionally further comprises a filler material.

8App. Br., p. 11.

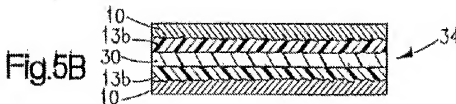
9F. 12.Claim 37 provides:

- 10 37. A multilayered construction suitable for forming capacitors  
11 which comprises:  
12  
13 a) a first electrically conductive layer, having first and second  
14 surfaces;  
15  
16 b) a first thermosetting polymer layer, having first and second  
17 surfaces, on the first electrically conductive layer with the first surface  
18 of the first thermosetting polymer layer on the second surface of the  
19 first electrically conductive layer;  
20  
21 c) a central polymerizable layer, having first and second surfaces, on  
22 the first thermosetting polymer layer with the first surface of the  
23 central polymerizable layer on the second surface of the first  
24 thermosetting polymer layer, which central polymerizable layer  
25 comprises a polymerizable precursor of a polyethylene terephthalate,  
26 a polyethylene naphthalate, a polyvinyl carbazole, a polyphenylene  
27 sulfide, an aromatic polyamide, a polyether-nitrile, a polyether-ether-  
28 ketone, or combinations thereof;  
29  
30 d) a second thermosetting polymer layer, having first and second  
31 surfaces, on the central polymerizable layer with the first surface of  
32 the second thermosetting polymer layer on the second surface of the  
33 second surface of the central polymerizable layer; and  
34  
35 e) a second electrically conductive layer, having first and second  
36 surfaces, on the second thermosetting polymer layer with the first

1 surface of the second electrically conductive layer on the second  
2 surface of the second thermosetting polymer layer;  
3  
4 wherein each of said first thermosetting polymer layer, said second  
5 thermosetting polymer layer and said central polymerizable layer  
6 optionally further comprises a filler material.  
7  
8App. Br., p. 15.

9**Appelt**

10F. 13.Appelt teaches a multilayered construction suitable for forming  
11 capacitors in electronic devices. Appelt, Abstract.  
12F. 14.Appelt's Figure 5B, reproduced below, shows a multilayered capacitor  
13 34:



14F. 15.The capacitor 34 includes first and second electrically conductive  
15 layers 10 and first and second dielectric layers 13b and central dielectric  
16 layer 30. Appelt, ¶ 0028.  
17F. 16.The electrically conductive layers 10 may be copper. Appelt, ¶ 0006.  
18F. 17.The first and second dielectric layers 13b are an epoxy polymer.  
19 Appelt, ¶ 0028.  
20F. 18.The central layer 30 is a polyimide. Appelt, ¶ 0028.  
21F. 19.Appelt teaches making the capacitor beginning with a central polymer  
22 layer, i.e., polyimide sheet 30, adding first and second thermosetting  
23 epoxy polymer layers 13b to each side, followed by bonding of the

25

1 electrically conductive copper layers 10 to the epoxy layers. Appelt, ¶  
2 0028.

3F. 20.Appelt does not teach a central polymer layer of an aromatic

4 polyamide or any of the other polymers required by Claim 1.

5F. 21.Appelt also does not teach an unpolymerized precursor as the central  
6 layer required by Claim 37.

### 7Fenoglio

8F. 22.Fenoglio teaches that aromatic polyamides, polyimides, polyamide-  
9 imides, and their mixtures are used extensively in the electronics industry  
10 as dielectric materials for interlevel dielectrics, electrical component  
11 substrates, protective coatings, and insulating coatings and films.

12 Fenoglio, Abstract, and col. 1, ll. 22-31 and 59; and col. 2, ll. 11-47.

13F. 23.Based on Fenoglio's teachings, one of ordinary skill in the art would  
14 have recognized the interchangeability of aromatic polyamides,  
15 polyimides, polyamide-imides, and their mixtures as dielectric materials  
16 in electrical components.-

17

### ISSUES

18 The Examiner contends that the subject matter of Claims 1-13, 15, 18-  
1933, 37-42, 44, and 47 would have been obvious over the combined teachings  
20Appelt and Fenoglio. Ans., pp. 3-5. The Examiner finds that Appelt teaches  
21a multilayered construction suitable for forming capacitors. Ans., pp. 3 and  
224. The Examiner further finds that Fenoglio teaches the "functional  
23equivalence" of polyamides, polyimides, and polyamide-imides as  
24dielectrics and that one skilled the art would have had reason to utilize any  
25of them as the central dielectric layer in Appelt's capacitor. Ans., p. 7. The  
26Examiner concludes that it would have been obvious to substitute the

1polymers taught by Fenoglio for Appelt's polyimide central layer. Ans., p. 24.

3 Applicant contends that it would not have been obvious to substitute  
4 the central layer of Appelt with the polyamide-imide taught by Fenoglio.  
5 App. Br., pp. 6-10. Applicant further contends that neither Appelt nor  
6 Fenoglio teaches the use of a polymer precursor as the central layer. App.  
7 Br., pp. 8 and 9.

8 The overall issue is whether Applicant has shown that the Examiner  
9erred in rejecting the subject matter of the claims as obvious over the  
10combined teachings of Appelt and Fenoglio. This issue breaks into two  
11subsidiary issues: (1) with respect to Claims 1-13, 15, and 18-33, whether it  
12would have been obvious to substitute Fenoglio's aromatic polyamide  
13dielectric for Appelt's polyimide dielectric and (2) with respect to Claims  
1437-42, 44, and 47, whether it would have been obvious to substitute an  
15unpolymerized central layer for Appelt's central polymer layer.

## 16 ANALYSIS

17 Applicant defines his invention in terms of the two independent  
18claims, Claims 1 and 37, and a number of dependent claims. Applicant has  
19not presented separate arguments for any of the dependent claims. Those  
20claims therefore stand or fall with their respective independent claims.  
21While Applicant has not provided separate arguments as to Claims 1 and 37,  
22for reasons which appear below, we address Claims 1 and 37 separately.

23 The claimed subject matter pertains to a multilayered construction  
24 suitable for forming capacitors. Spec., p. 1, ll. 11-13, and p. 3, ll. 25 and 26.  
25 Applicant's Figure 1, reproduced below, shows a schematic representation  
26 of a multilayered capacitor according to Applicant's invention:



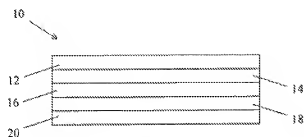


FIG. 1

1 Referring to Figure 1, the multilayered capacitor 10 includes  
2 electrically conductive layers 12 and 20 separated by inner layers 14, 16, and  
3 18. Spec., p. 6, ll. 7-19. The electrically conductive layers 12 and 20 may  
4 be copper. Spec., p. 8, ll. 2 and 3. The inner layers 14, 16, and 18 are  
5 dielectric. Spec., p. 1, ll. 13-16 and 22-24; and p. 3, ll. 12-22. Inner layers  
6 14 and 18 are thermosetting polymers, preferably an epoxy. Spec., p. 1, ll.  
7 13-16 and 22-24; p. 3, ll. 9-22; and p. 11, ll. 2 and 3. The subject matter of  
8 Claims 1 and 37 differ in the nature of the central layer 16. In Claim 1 the  
9 central layer is made of certain specified polymers. In Claim 37 the central  
10 layer is an unpolymerized polymer precursor.

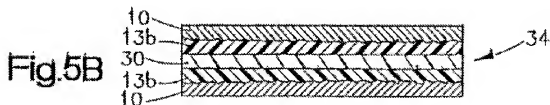
# 11 **Claim 1**

12 In Claim 1, Applicant has chosen to describe the invention in terms of  
13 the process of making it. Thus the claim begins: “A multilayered  
14 construction suitable for forming capacitors *which is formed by a process*  
15 *which comprises...*” App. Br., p. 11 (Italics added). Patentability of such  
16 “product-by-process” claims depends on the structure and characteristics of  
17 the resulting product itself, not on the process steps. *SmithKline Beecham*  
18 *Corp. v. Apotex Corp.*, 439 F.3d 1312, 1317 (Fed. Cir. 2006); *In re Thorpe*,  
19 777 F.2d 695, 697 (Fed. Cir. 1985). Where the structure and characteristics  
20 of the claimed product is the same as or would have been the obvious from

1the structure and characteristics of the prior art product, the burden shifts to  
2the Applicant to show an unobvious difference for the claimed product.  
3*Thorpe*, 777 F. 2d at 698. Thus, in deciding the patentability of the subject  
4matter of Claim 1, we compare the structure and characteristics of the  
5multilayered capacitor of Claim 1 with the structure and characteristics of  
6the capacitor described by Appelt.

7 The process of making the “multilayered” structure includes the steps  
8of applying a polymerizable layer of specified polymer precursors to a  
9thermosetting layer (Step b) and polymerizing (Step c). Thus, the subject  
10matter of Claim 1 is a multilayered structure having electrically conductive  
11layers 12 and 20, thermosetting polymer layers 14, and 18, and a central  
12layer 16 of specified polymers .

13 Appelt teaches a multilayered capacitor. Appelt, Abstract. Appelt’s  
14Figure 5B shows an embodiment which is reproduced below:



15Figure 5B shows a side-view of a capacitor 34 having first and second outer  
16electrically conductive layers 10, first and second inner epoxy polymer  
17layers 13b, and a central polymer layer 30 of polyimide. Appelt, ¶ 0028.

18 Appelt does not teach the use of any of the central layer polymers  
19required by Claim 1.

20 Fenoglio relates to certain aromatic polyamides, polyimides and  
21polyamide-imides and their uses. Specifically, Fenoglio teaches that

1aromatic polyamides, polyimides and polyamide-imides have found  
2extensive use as dielectrics. Fenoglio, col. 1, ll. 22-26. Fenoglio also says  
3these polymers have been used both as interlevel dielectrics and as coatings  
4and films for insulating coatings. Fenoglio, col. 1, ll. 28-31 and 2, ll. 11-47.  
5One having ordinary skill in the art would have recognized the  
6interchangeability of aromatic polyamides, polyimides and polyamide-  
7imides polymers as dielectrics. In view of the interchangeability, it would  
8have been obvious to substitute an aromatic polyamide for the polyimide  
9central dielectric layer in the capacitor described by Appelt.

10       Applicant argues that it would not have been obvious to substitute the  
11polyamide-imide polymer taught by Fenoglio for Appelt's polyimide central  
12layer. App. Br., pp. 6-10. Fenoglio's teachings, however, are not limited to  
13polyamide-imide dielectrics. Fenoglio also teaches the use of aromatic  
14polyamides as dielectrics. Fenoglio, Abstract; col. 1, ll. 22 and 59; and col.  
152, ll. 11-47. One skilled in the art would have recognized that the aromatic  
16polyamide dielectric taught by Fenoglio could have been substituted for the  
17polyimide as the central layer of the capacitors taught by Appelt. In view of  
18this teaching of the interchangeability of polyimides, aromatic polyamides  
19and polyamide-imides, it would have been at least obvious to try substituting  
20an aromatic polyamide for Appelt's polyimide. *KSR Int'l Co. v. Teleflex*  
21*Inc.*, 127 S. Ct. 1727, 1742 (2007). Further, in light of the interchangeability  
22of the polymers, one skilled in the art would also have had a reasonable  
23expectation that Fenoglio's aromatic polyamides would be work as the  
24central dielectric layer in Appelt's capacitor. Obviousness requires only a  
25reasonable expectation of success. *In re O'Farrell* 853 F.2d 894, 904 (Fed.  
26Cir. 1988).

1 Applicant argues that neither Appelt nor Fenoglio teaches the use of  
2the polymerizable precursor as the central layer. App. Br., p. 8. However,  
3the product of Claim 1 does not require a polymerizable precursor. Rather,  
4the product of Claim 1 requires a central polymerized layer. See Claim 1,  
5paragraph e); and Spec. p. 12, ll. 18-26. Applicant has not directed us to  
6evidence of an unobvious difference in structure and characteristics between  
7the subject matter of Claim 1 and the capacitor taught by Appelt.

8 Applicant also refers us to the proceedings in PCT application  
9PCT/US2005/001820, in which it is said that the same Examiner found  
10“identical” claims to have novelty and an inventive step on an identical  
11record. App. Br., pp. 5-6. Applicant contends that the present rejection  
12“shows an inconsistency in reasoning” with the PCT determination and  
13“should be overruled”. App. Br., p. 6.

14 Applicant appears to be arguing that the Examiner is estopped from  
15reaching a legal conclusion contrary to that arrived at in PCT case.  
16However, assuming without deciding that the claims and records are  
17identical, Applicant has provided no authority holding that the principles of  
18estoppel apply against the Office in these circumstances. In any event,  
19Applicant has not refuted the Examiner’s argument that the U.S. and PCT  
20legal standards are different. Ans., p. 8.

21 The rejection of Claims 1-13, 15, and 18-33 is affirmed.

22**Claim 37**

23 The subject matter of Claim 37 also involves a multilayered  
24construction suitable for use as a capacitor. Claim 37 differs from Claim 1  
25in requiring a central unpolymerized layer. Compare App. Br., pp. 11 and  
2615. Appelt’s multilayered capacitor includes a central polymer layer.

1       The Examiner has not presented a rationale or directed us to any  
2disclosure in the prior art that provides a reason for substituting an  
3unpolymerized precursor for Appelt's central polymer layer. "[T]here must  
4be some articulated reasoning with some rational underpinning to support  
5the legal conclusion of obviousness". *In re Kahn*, 441 F.3d 977, 988 (Fed.  
6Cir. 2006). Neither Appelt nor Fenoglio teaches an unpolymerized  
7precursor for the central layer.

8       If anything, Appelt appears to "teach away" from the use of an  
9unpolymerized precursor. Appelt teaches forming a capacitor by laminating  
10the thermosetting material and metallic layers to both sides of a preformed  
11polymer sheet. The preformed polymer sheet becomes the central layer of  
12the capacitor. Appelt, ¶ 0028. The substitution of an unpolymerized  
13precursor for Appelt's polymer would appear to make that process  
14inoperative. Based upon the art relied upon there would be no reason to  
15substitute an unpolymerized precursor for Appelt's preformed polymer.

16       The rejection of Claims 37-42, 44, and 47 is reversed.

17                               CONCLUSIONS OF LAW

18       On the record before us, Applicant has not sustained the burden of  
19establishing that that Examiner erred in holding that the subject matter of  
20Claims 1-13, 15, and 18-33 would have been obvious within the meaning of  
2135 U.S.C. § 103(a).

22       However, Applicant has sustained its burden of establishing that that  
23Examiner erred in holding that the subject matter of Claims 37-42, 44, and  
2447 would have been obvious within the meaning of 35 U.S.C. § 103(a).

1

DECISION

2       The decision of the Examiner rejecting the subject matter of Claims 1-  
313, 15, and 18-33 under 35 U.S.C. § 103(a) is affirmed.

4       The decision of the Examiner rejecting the subject matter of Claims  
537-42, 44, and 47 under 35 U.S.C. § 103(a) is reversed.

6       No time period for taking any subsequent action in connection with  
7this appeal may be extended under 37 C.F.R. § 1.136(a).

8

9

AFFIRMED-IN-PART

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